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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/993,208	11/16/2001	Jinbao Jiao	AP01979	8084

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EXAMINER

AFTERGUT, JEFF H

ART UNIT

PAPER NUMBER

1733

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5

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/993,208

Applicant(s)

JIAO ET AL.

Examiner

Jeff H. Aftergut

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 March 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 and 21-28 is/are pending in the application.
- 4a) Of the above claim(s) 11,12,27 and 28 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 and 21-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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Election/Restrictions

1. Claims 11-12 and 27-28 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 3.

Claim Rejections - 35 USC § 102/103

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-4, 6, 7, 10, 21-24 and 26 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Stopperan.

Stopperan suggested that those skilled in the art at the time the invention was made would have joined a flexible printed circuit board to a rigid printed circuit board with the use of a thermosetting adhesive. The reference suggested that one skilled in the art would have screen printed the thermosetting conductive adhesive upon the rigid board. Following screen printing, one would have exposed the rigid board and adhesive to heat in a heating oven to partially cure the adhesive to a B-stage cure. After B-staging the resin disposed upon the rigid board, the

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reference suggested that one disposed the flexible circuit board upon the rigid board in the proper alignment. Once properly positioned upon the rigid board, the assembly of the rigid board, the B-staged adhesive and the flexible board are disposed in a press and addition heating takes place in the same in order to fully cure the B-staged adhesive to make a joint between a flexible printed circuit board and a rigid circuit board. The applicant is more specifically referred to column 13, line 67-column 14, line 65. The reference expressly suggested that the adhesive would have been applied to the rigid board via screen printing. While the reference did not expressly recite that the adhesive employed to make the bond between the rigid and flexible boards was a dual cure system adhesive, the adhesive was exposed to two separate curing operations in much the same manner that applicant's adhesive was and therefore it is believed that the adhesive employed in the operation was in fact a dual cure adhesive material. Regarding the limited flowability of the B-staged resin, one viewing the reference to Stopperan would have understood that B-staging the resin would have increased the viscosity of the same as the resin gelled to the B-stage (as such is conventional in the art of staging a thermosetting resin). Applicant is additionally advised that the meaning of the term "rigidizer" is taken to mean a rigid substrate which would "rigidize" a portion of a flexible board when the flexible board was laminated thereto. There is no indication that the rigid board of Stopperan would not have acted in this manner. It should be noted that Stopperan suggested that one would have applied the resin onto the rigid board in a liquid state and cured the same with heat to a B-stage condition followed by rigid board to flexible board assembly and final cure of the resin with the application of heat. As such, as noted above, the resin would have been viewed as a dual cure resin. Regarding claims 21-34 and 26, the above noted comments apply. The exact scope of the term "rigidizer" is not clear and one would have

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been expected to understand that joining a flexible substrate to a rigid substrate would have included the steps of employing a thermosetting resin of the same kind as described by Stopperan. It would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the techniques of Stopperan to join a rigidizer to a flexible printed circuit board.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-4, 6-8, 10, and 21-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Klosowiak et al '418 in view of Stopperan optionally further taken with either one of Li et al or Klosowiak et al '362.

Klosowiak et al '418 suggested that it was known to join rigidizer plates 23-25 by bonding to a flexible printed circuit board substrate 11 (note that the reference is silent as to the type of adhesive employed to bond the rigidizers 23-25 to the printed board). The applicant is referred to column 4, lines 14-24. These rigidizers are added prior to any folding of the assembly and additionally functioned as a heat sink for the flexible circuit board, see column 4, lines 24-30. One skilled in the art would have been led to look to suitable techniques for joining a flexible board to a rigid substrate with adhesive. Such would have included the techniques of Stopperan. Applicant is referred to paragraph 4 above for a complete discussion of the reference. It would have been obvious to one of ordinary skill in the art at the time the invention was made to join

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the flexible circuit of Klosowiak et al '418 with a thermosetting resin as suggested was a known bonding technique for joining a flexible board to a rigid substrate as taught by Stopperan. While Klosowiak et al '418 clearly envisioned the folding of the assembly after the bonding of the rigidizer to the flexible board, the reference to Klosowiak et al '418 did not physically bend the rigidizer plates themselves but only bent the flexible board therein.

However in the art of joining the flexible board to a rigid board, one skilled in the art would have understood that a rigidizer would have been folded with a flexible board attached thereto wherein the rigidizer was bent during the folding operation as suggested by either one of Klosowiak et al '362 or Li et al. more specifically, the rigidizers therein are provided with channels (24 and 25 in Klosowiak et al '362 and 29 and 30 in Li et al) about which the rigidizer plates are bent. While the reference to Klosowiak et al '418 did not provide such an arrangement but instead utilized 3 separate plates to join to the flexible board, it would have been viewed by those skilled in the art as an alternative structure for the rigidizer which was functionally equivalent to the use of three separate plates (wherein the assembly process was simplified by merely having to utilize a single plate rather than three separate plates). It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a rigidizer plate which was later bent with the flexible board rather than three separate plates for the rigidizer as suggested by either one of Li et al or Klosowiak et al '362 in the process of making a rigidized flexible printed circuit board assembly as suggested by Klosowiak et al '418 wherein one utilized the thermosetting adhesive bonding operation of Stopperan.

7. Claims 4, 6, 23, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as set forth above in paragraph 6 further taken with "Chipbonding Adhesive"

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(from Rubber Word, cited by applicant on the 1449) or “Dual Cure System Adhesives” (from Adhesives Age also cited by applicant).

The references as set forth above suggested that one skilled in the art at the time the invention was made would have joined the flexible board to the rigid board with an adhesive which was a “dual cure” adhesive in that two separate curing operations were provided for in order to cure the resin therein. The references however did not expressly refer to the resin as one which was a “dual cure” system. However such resin systems were known for bonding chips to circuit boards as evidenced by either one of “Chiponding Adhesive” or “Dual Cure System Adhesives”. The references to “Chiponding Adhesive” or “Dual Cure System Adhesives” suggested that one skilled in the art at the time the invention was made would have readily appreciated that a thermosetting adhesive which was a dual cure resin would have been suitable for use in bonding components to printed circuit boards. It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a dual cure adhesive of the type referred to by either one of “Chiponding Adhesive” or “Dual Cure System Adhesives” in the process of joining a flexible printed circuit board to a rigidizing component as such was an art recognized adhesive material suitable for such a purpose and the references as set forth above suggested such dual curing systems with heat curing as set forth above in paragraph 6.

With regard to the properties of the adhesive (the high viscosity and the lack of flow with the desired tackiness, the references to “Chiponding Adhesive” or “Dual Cure System Adhesives” suggested that the resins would have had the identified properties and the applicant is advised that B-staged resins are tacky typically as was known in the art.

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8. Claims 5, 6, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over the references as set forth above in paragraph 6 further taken with Griffith et al.

The references as set forth above in paragraph 6 suggested the overall operation with a thermosetting resin, however there is no express teaching in Stopperan that one skilled in the art at the time the invention was made that one skilled in the art would have selected an epoxy for this purpose. However, when joining a rigid substrate to a flexible printed wiring board, it was known at the time the invention was made to employ an epoxy resin (which was initially disposed upon the rigid substrate in a b-staged condition and subsequent to assembly with the flexible board was fully cured) for such purpose as evidenced by Griffith et al. more specifically, the applicant is referred to column 2, line 3-68. Clearly, it would have been within the purview of the ordinary artisan to employ an epoxy resin as the thermosetting adhesive material in the joining of the rigidizer to a flexible printed circuit board. It would have been obvious to one of ordinary skill in the art at the time the invention was made to employ the resin materials of Griffith et al when joining a flexible board to a rigid structure as set forth above in paragraph 6 (the use of an epoxy resin would have been viewed as a functionally equivalent alternate expedient for the thermosetting resin employed by Stopperan).

Conclusion

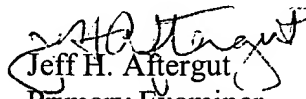
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeff H. Aftergut whose telephone number is 703-308-2069. The examiner can normally be reached on Monday-Friday 6:30-3:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael W. Ball can be reached on 703-308-2058. The fax phone numbers for the

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organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.


Jeff H. Aftergut
Primary Examiner
Art Unit 1733

JHA
April 4, 2003